

Claims

1. An irregular pattern reader comprising:

a prism possessing a detection surface on which a subject to be detected having an irregular pattern is put and an incident plane having a first angle of inclination to said detection surface, and emitting a light reflected on said detection surface corresponding to a light incident upon said incident plane;

a first optical system possessing a light source and causing a light from the light source to be incident on said incident plane of said prism with its optical axis substantially in parallel to said detection surface; and

a second optical system for transmitting the emission light emitted from said prism to an image pick-up device.

2. The irregular pattern reader according to claim 1, wherein ~~the~~ said emission light is emitted substantially ~~in~~ parallel to said detection surface.

3. The irregular pattern reader according to claim 2, wherein said prism ^{includes} ~~possesses~~ an emission plane having a second angle of ^{relative} ~~inclination~~ to said detection surface, and ^{the} ~~said~~ emission light is emitted from said emission plane.

4. The irregular pattern reader according to claim 2, wherein ~~the said~~ emission light is emitted from said prism in a direction opposite ~~the said~~ incident light.

5. The irregular pattern reader according to claim 4, wherein said prism ^{includes} ~~possesses~~ a reflection surface having a third angle of inclination ^{relative} to said detection surface, and ~~said~~ light from said detection surface ^{diverted} ~~turned~~ at said reflection surface is emitted from said prism as ^{the} ~~said~~ emission light.

6. The irregular pattern reader according to claim 3, wherein

Sub A2 } said first optical system is provided with first incident light turning means for receiving and turning said incident light from said light source and causing said incident light to be incident on said incident plane.

5 Sub B1 } 7. The irregular pattern reader according to claim 3, wherein
A said second optical system ^{includes} ~~is provided with~~ emission light turning means ^{diverting the} ~~for receiving and turning~~ said emission light and forming an image on an image pick-up plane of said image pick-up device.

10 8. The irregular pattern reader according to claim 3, wherein said second optical system possesses lenses of different magnifications respectively in vertical direction and in horizontal direction, and said lenses converge said emission light in vertical direction or in horizontal direction and form an image on said image pick-up plane of said image pick-up device

15 Sub B1 } 9. The irregular pattern reader according to claim 3, wherein
A said prism ^{includes} ~~is provided with~~ luminous flux converging means for ^{the} ~~horizontally converging~~ said emission light on said detection surface.

20 10. The irregular pattern reader according to claim 4, wherein said prism possesses a reflection surface for reflecting said light reflected on said detection surface and a lens portion for receiving the light from said reflection surface and emitting the light to said second optical system, and said image pick-up plane of said image pick-up device for receiving the light from said second optical system is located substantially in parallel to said detection surface.

25 Sub B1 } 11. The irregular pattern reader according to claim 5, wherein
A the light reflected ^{from} ~~on~~ said detection surface is reflected ^{from} ~~again on~~ said incident plane, and ~~the light is emitted as~~ ^{the} emission light through said reflection surface.

30 A 12. The irregular pattern reader according to claim 5, wherein ^{the} ~~said~~ first angle is less than 45° and more than an angle (θ_3) obtained

by subtracting an angle of reflection at said detection surface from 90° .

13. The irregular pattern reader according to claim 10, wherein ^{through which} a region ^{where} a luminous flux in said prism does not pass ^{through} is omitted from a plane of said prism facing said detection ^{surface} face.

14. The irregular pattern reader according to claim 13, wherein said detection surface of said prism is approximately 20mm in width and approximately 15mm in length, ^{and} ~~while~~ said prism is not more than 10mm in thickness from said detection surface of said prism to the image pick-up device.

15. The irregular pattern reader according to claim 10, wherein said first optical system possesses said light source located on an electronic substrate, a second collimator lens and second incident light turning means located between said light source and said second collimator lens, and said incident light is incident upon said incident plane through said light source, said second incident light turning means and said second collimator lens in order.

16. The irregular pattern reader according to claim 15, wherein said second incident light turning means ^{includes a transparent} ~~is formed on~~ block of ~~transparent resin or glass~~, and an incident light emission plane of said second incident light turning means ^{includes} ~~is provided with~~ said second collimator lens.

17. The irregular pattern reader according to claim 16, wherein said second optical system is located on said image pick-up plane of said image pick-up device.

18. The irregular pattern reader according to claim 17, wherein said second incident light turning means is not more than 10mm in thickness.

19. The irregular pattern reader according to claim 10, wherein said first optical system, said prism in which a region where a luminous

Sub 45

A 20

Sub 46 30

Sub
A6

A

Add 101